PREVENTION OF MICROBIAL GROWTH IN PAINTS USING HERBAL BIOCIDES AVALIABLE IN SRI LANKA

By

G.P.S.Premarathne

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Department of Chemical and Process Engineering

University of Moratuwa

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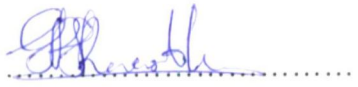
DECLARATION

" I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any University in the best of my knowledge and belief it does not contain any material previously published, written or orally communicated by another person except where due reference is made in the text"



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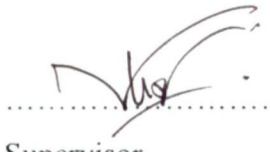

Supervisor
(Dr. B.A.J.K. Premachandra)

ABSTRACT

Certain fungal types can grow on dried paint films. They cause to deteriorate the dried paint films. Currently synthetic fungicides are used to prevent fungal growth. They are hazardous compounds, which caused irritation of eyes and skin, skin rashes, etc of humans. Therefore it is important to replace synthetic fungicides by environmentally friendly natural fungicides (extracted from plants).

In this work cinnamon leaf oil, citronella oil and neem seed oil were used as natural fungicides. 8 fungal types grown on dried paint films were used to investigate the anti-fungal activity of the above oils. Quantitative analysis of cinnamon leaf oil and citronella oil were done using gas chromatography and quantitative analysis of neem seed oil was not done due to unavailability of standards. Modified method of agar over-lay technique was used to determine minimum inhibition concentration of the fungal types used, after introducing three oils. The results indicated cinnamon leaf oil is the best to use as fungicide for exterior emulsion paint out of three oils, as growth of all used fungal types were inhibited below at concentration of 2000 ppm, when introducing cinnamon leaf oil into each fungal type individually. It was more than 12000 ppm in citronella oil and more than 20000 ppm in neem seed oil.

Modified method of ASTM D2373-74 was used to determine the minimum inhibition concentration of cinnamon leaf oil to inhibit fungal growth on exterior emulsion paint film. Aging tests were done to determine effect of cinnamon leaf oil on viscosity, pH, colour of exterior emulsion paint and adherence of binder to the substrate after aging for three years. Tropical chamber test was used as an accelerated test method to investigate fungal degradation after applying cinnamon leaf oil as fungicide. According to the results, fungal growth in exterior emulsion paint could be inhibited below 3500 ppm of cinnamon leaf oil and applied paint film on a surface of an exterior substrate will not attack by fungi for 2-3 years. Significant changes in viscosity, pH, colour of the exterior emulsion paint and adherence of binder to the substrate were not detected due to cinnamon leaf oil. Results suggest that cinnamon leaf oil can be used as a fungicide to prevent growth of fungi considered and for the exterior emulsion paint used.

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